

DLMS-NetWork

V 1.0

USERS MANUAL

This document intended to guide the user to install, configure and use the DLMS-NetWork software.



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1 INTRODUCTION

DLMS-NetWork is software that provides a visual user interface for monitoring and maintaining and calibrating multiple DigiCell device.

1.1 FEATURES

Plug sensing

- Automatically detects device type and provides calibration and setup regarding the device connected.

Visual user interface

- Simulates the visual properties of the device connected for display and basic control buttons.
- Provides easy device setup interface by Windows standard property window.
- Easy device calibration method.

Logging

- Logs display values to text file in level triggered basis as data logging.
- Data logging may have delay in order to ensure the data is setup after a load change.
- Data to be logged to a database file with device IDs.

1.2 MINIMUM SYSTEM REQUIREMENTS

Hardware

- Pentium Family CPU 233MHz or Higher
- 32MB RAM (higher recommended)
- 10MB harddisk space (higher space recommended for data logging)
- 800x600 high color or true color graphics adapter and compatible monitor
- Hardware COM ports
- RS232C/RS485 converters for port
- CD-ROM Drive (required only for installation)

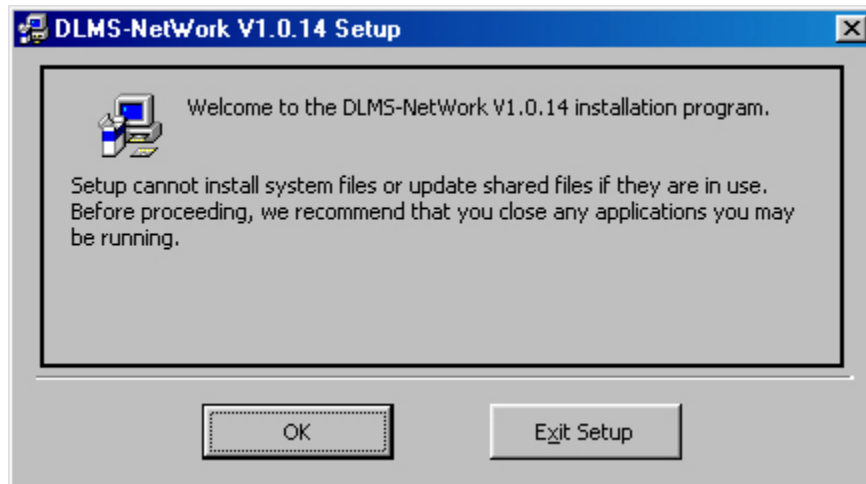
Software

- Windows 95/98/NT/2000/XP operating system

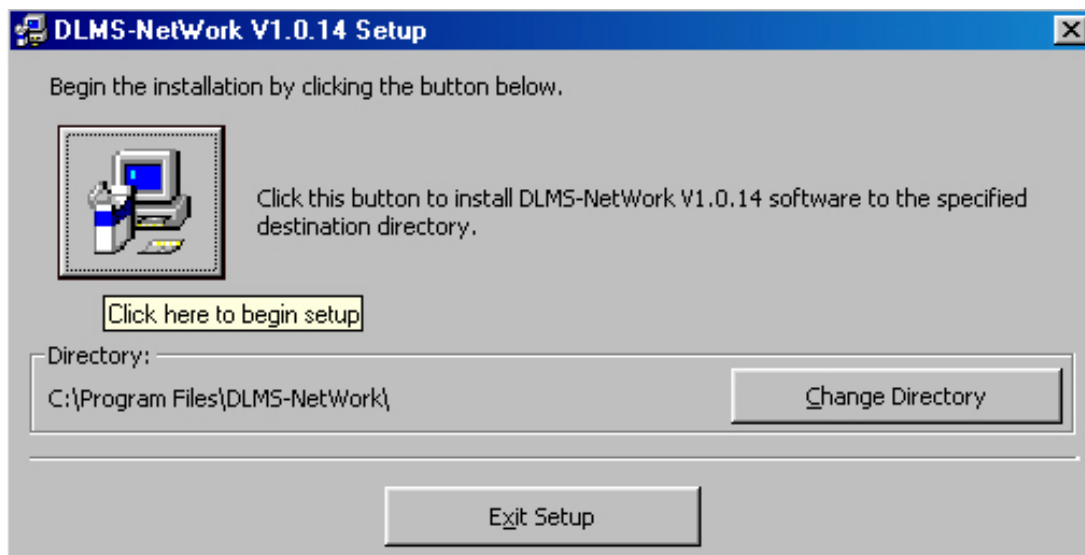
2 SOFTWARE INSTALLATION

2.1 INSTALLATION PROCEDURE

- 1- Close all open applications running and insert the install CD into CD-ROM Drive.
- 2- The Setup utility will normally run automatically. If it does not run (your CD-ROM may be configured not to run applications automatically) then click My Computer on desktop, click CD-ROM icon next and run Setup.Exe from CD.
- 3- Setup will copy the files necessary for installation to the temporary folder automatically and will prompt a warning about closing the other applications, click OK if there is no application currently running.



- 4- Setup will prompt for the directory for installation, you may change it by "Change Directory" or you may leave it as default and continue to installation by clicking the icon button on the left of window.



- 5- Setup will install all necessary files and registry automatically and prompt when installation finished.
- 6- Your computer may need to be rebooted after the installation, the prompt will ask to reboot or do it later, rebooting that time strongly recommended, the software may not work properly if prompted and run without rebooting.
- 7- The DLMS-NetWork icon will be added to start menu after the installation.

3 CONNECTIONS AND COMMUNICATIONS

The physical connections must be established and the communication parameters must be specified properly to establish a link between the PC and the DigiCell device. PC acts as DCE and DigiCell devices functions as DTE in communications.

3.1 CONNECTIONS

DigiCell series communicate by ModBus protocol. DigiCell series those have RS232 interface port can directly connected by a three-wire communications cable to PC. DigiCell devices that have RS485 port need to be connected by an RS232/RS485 converter.

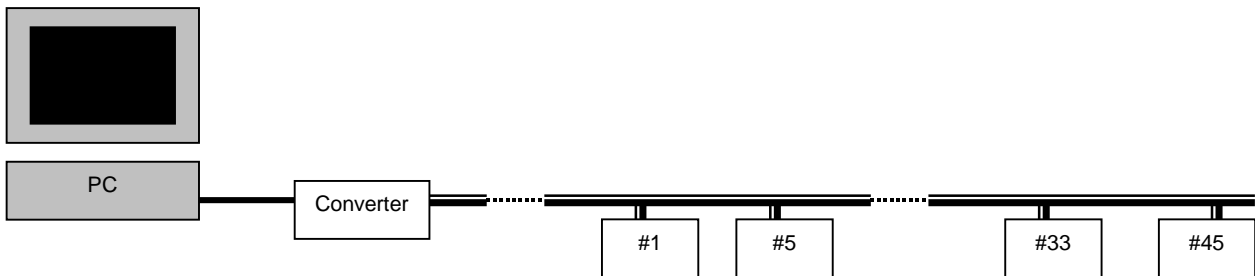


Figure 1. Connection for RS232 port DigiCell devices

DigiCell series with RS232 ports also communicates by the ModBus protocol. ModBus protocol supports many devices can be connected to same communication line as a bus in case physical communication layer supports multi-drop connections.

RS232 interface does not support multi-drop communications, thus only one device can be connected to same line at a time even if ModBus communications used. The RS232 cable can be obtained by the manufacturer.

RS485 is a multi-drop communications layer but an RS232/RS485 converter must be devised to connect an RS485 bus to a communications port of a PC in order to match the electrical signals and direction of communication information flow. A compatible RS485/RS232 converter can be obtained by the manufacturer.

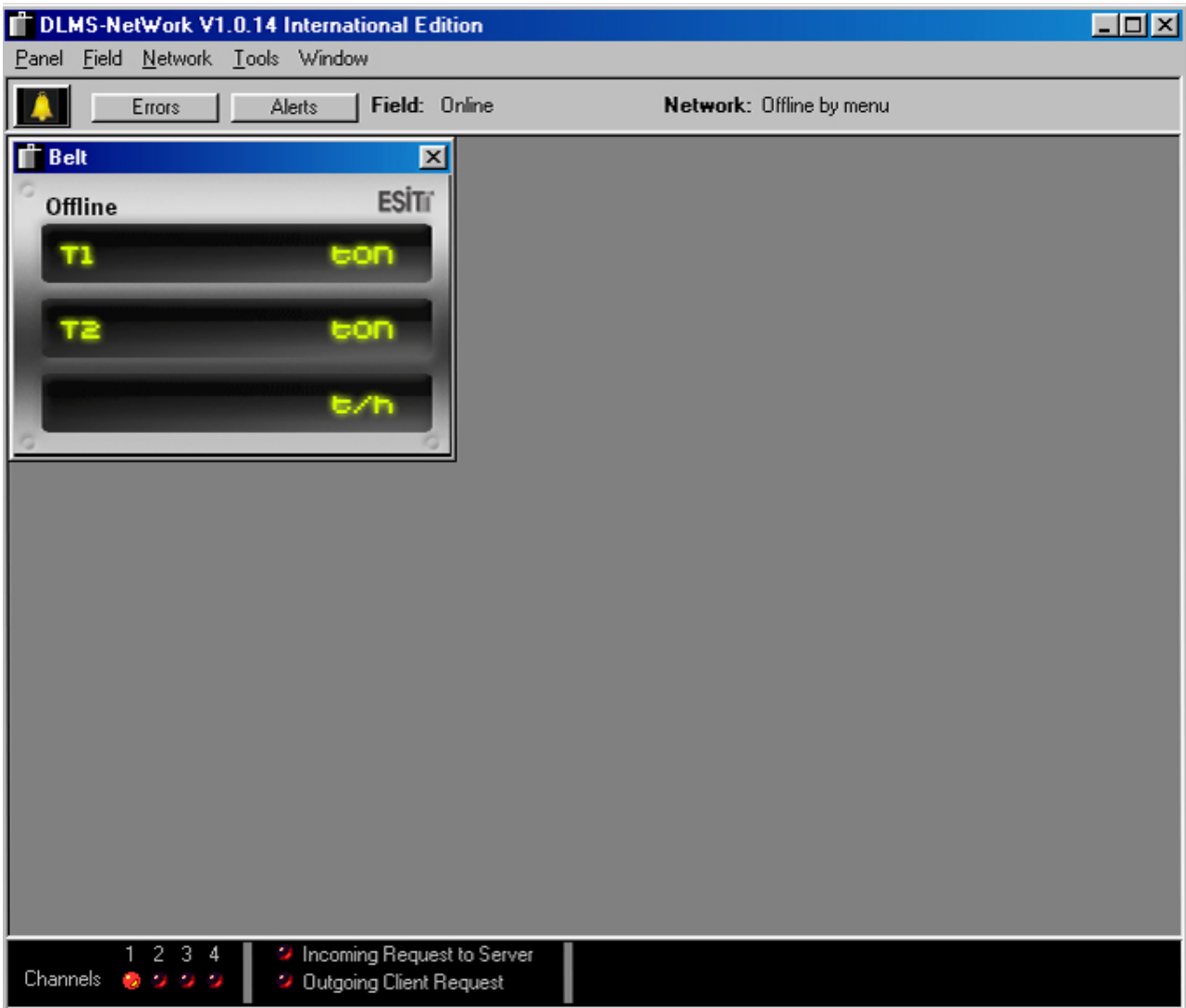


Attention: RS485/RS232 conversion is a complicated process that includes the data direction control. Many third party RS232/RS485 converters have a data direction control based on special functions of PC side communication ports or may have incompatible delays to run with DLMS software. Third party converters may not function properly with DLMS software except those suggested by the manufacturer.

DLMS-NetWork can communicate with any of the devices on a multi-drop bus by changing the configuration of PC communication parameters of the software, but not at a time. As a convention of ModBus protocol, all devices on the same bus must have the same communication parameters.

3.2 DEVICE COMMUNICATIONS

DLMS_NetWork screen appearance.



DLMS-NetWork can communicate with Digicell devices and can also communicate with the other computers on the network via TCP/IP protocol. There are two separated communication setups.

- **Local Devices**

This section defines the local devices that connected to the PCs comm port(s). Before modifying any port or device settings, please make sure that “Work Offline” box checked.



After making communication offline (“Work offline” mod), make comm port settings.



- **Network Devices**

Once a device has been detected, the simulated LCD display will indicate the load, status of stability and zero upon current actual status.

All buttons will be enabled if the program key is enabled by the device. The calibration button (-C-) may remain disabled with cross over it if the program is disabled by the device.

The device will not go into the online mode if the communication port and parameters selected differ those of the device. The default communication parameters of DLMS-NetWork software matches factory default communication parameters of DigiCell devices. The common adjustment will be the communication port selection if communication parameters of either the software or the device is not modified on purpose.

Please follow the steps below to establish a successful link between PC and the device;

- 1- Connect the DigiCell device by appropriate cable to the communications port of PC.
- 2- Power-up the DigiCell
- 3- Run DLMS-NetWork software
- 4- Click the following PC communications button to popup the PC communication settings window.
- 5- Select the communications port that the device is connected to the PC. This option is COM1 by default. You may need to change it to appropriate port if it is being used by another device.
- 6- Click Apply and check the panel in background if the communication established successfully, there may be an error message if any inappropriate port is selected. Try another if you are not sure which port is being used.
- 7- Click OK when finished. A temporary offline condition will occur within a second and the connection will be saved automatically after clicking OK button.



4 CONTROL BUTTONS OVERVIEW

Control buttons provide Zero, Tare operations, device setup, calibration, PC communication settings and logging preferences. The general functions are depicted below, please see the referenced section for details.



USER ZERO

Available only when online. Provides the functionality to set the gross value to zero when clicked. User zero can be operational in certain limits and conditions and may result to a warning message that this operation cannot be done if the conditions of measurement are not appropriate for this operation. Please see device manuals for conditions for zero operation.



TARE TOGGLE

Available only when online. Toggles tare between Gross and Net/Tare mode. Clicking this button will result the current captured value as the tare value and the net value is being displayed. Clicking this button when a tare value is already captured will result the tare to be cleared and gross value displayed until a new tare value captured. Tare functionality is limited to certain conditions and a warning message may be displayed if tare function cannot be done at that time. Please see device manuals for conditions for tare operation.



CALIBRATION

Available only when online and the program key is on. Reads current calibration data from device and pops up the calibration window. The calibration windows functionality depends on the device type. Refer to the "Calibration" section of corresponding device type. The program key is a hardware key on the device that is not accessible without sealing the device off. This button will be disabled by a white cross on it when the program key is in off position. Please refer the device manuals for the position of the program key.



SETUP

Available only when online. Reads current setup from device and pops up the setup window. Some information are protected by the program key and will not be written after the setup. Setting up all available information will require the program key is in on state. Please refer to Device Setup section for further information.



PC COMMUNICATION PARAMETERS

Enables the user to change the parameters that the personal computer use in communications to a device. The communication port, baudrate, framing properties and device ModBus number can be selected by the following window pops up after clicking this button.

Communication Options			
Port	COM1	Baudrate	9600
Protocol	RTU	Parity	None
HB Modbus Address	1	Data Bits	8 Bit
		Stop Bits	1 Bit
		OK	
		Apply	
		Cancel	

The port must be selected as the port that is connected to the device. The values; Protocol, Baudrate, Parity, Data Bits and Stop Bits must match the device connected. HB Modbus Address is an ID of the device being communicated and must match the correct address which the device is being identified for either the device on the bus or a single device connected. The address ranges 1 to 255. OK button saves selected parameters and closes the current window. Apply does the same without closing the current window. Cancel leaves settings as last Apply or OK clicked.



LOGGING OPTIONS

Enables the user to modify logging options. Please refer to Logging section of this document for details.



SYSTEM INFORMATION

Opens an about dialog box and displays software information about DLMS-Virtual Panel. This window also includes rated values of DigiCell if connected at the time this button clicked.

5 CALIBRATION

Calibration process differs in digital input DigiCell devices, such as DigiCell DLT and analog input DigiCell devices, such as DigiCell DC-xxx, LCA-X or LCA-D. DigiCell series with digital input can communicate with multiple analog input DigiCell devices and the calibration process covers the corner calibration as well as overall calibration. DigiCell series those use analog inputs calibrated only as overall calibration.

DLMS-NetWork identifies the device automatically and pops up the related calibration window if the calibration button clicked. This button is enabled only if the program key is ON on the device. Please see the related device manuals for where the program key is located on the device.



5.1 CALIBRATION OF DIGICELL LCA-X, LCA-D, DC-xxx SERIES DEVICES

Once the calibration key pressed the software will read existing calibration data and the calibration history and will pop up the following window.

Calibration

<p>Guide for calibration</p> <p>Unload the scale and press set zero button. The device will assume the current load is ZERO.</p> <p>Enter a load value and load the scale with the load entered. Device will assume current load as entered.</p> <p>Please keep in mind that the operations are permanent when buttons clicked. You may click "close" button to exit this window when finished.</p> <p style="text-align: center;"><input type="button" value="Close"/></p>	<p style="text-align: center;">Gross 380.00</p> <ol style="list-style-type: none"> <li style="margin-bottom: 10px;">1. <input type="button" value="Unload the scale"/> <li style="text-align: center; margin-bottom: 10px;">↓ <li style="margin-bottom: 10px;">2. <input type="button" value="Click here & Set Zero"/> <li style="text-align: center; margin-bottom: 10px;">↓ <li style="margin-bottom: 10px;">3. <input type="button" value="Load the scale"/> <li style="text-align: center; margin-bottom: 10px;">↓ <li style="margin-bottom: 10px;">4. <input type="text" value="Enter Load"/> kg <li style="text-align: center; margin-bottom: 10px;">↓ <li style="margin-bottom: 10px;">5. <input type="button" value="Click here & Set Load"/> <p style="text-align: center; border: 1px solid black; padding: 5px;">Ready for calibration</p>
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The green box indicates the current gross value measured and changes dynamically with the current load on the scale.

The calibration process must be performed by following the steps described.

- 1- The zero must be acquired from the input. Thus the scale must be unloaded first.
- 2- Clicking the "Click here & Set Zero" button will record the current input as the zero and write back it to device memory. This operation may take a few seconds that all buttons will be disabled. The green indicator will display zero after this operation completed.
- 3- The scale must be loaded to a certain load to enable the system measure that load and calculate the gain factor.

- 4- The load on the scale must be entered as the reference of current load that will be used in calculations.
- 5- Clicking "Click here & Set Load" button will result the calculations performed and written back to the device. This may take a few seconds to done. The green indicator will display the entered load after the write-back.
- 6- Clicking the Close button will update the calibration history of the device and will close the window if calibration changed.

These steps may be repeated until a proper calibration accomplished.

Attention: Steps in calibration cannot be undone. It is necessary to complete all steps before closing the window in order not to lead an uncertain state of calibration.

5.2 CALIBRATION OF DIGICELL DLT SERIES DEVICES

This feature is supported by the software but not documented since DigiCell DLT series are in development in time manual is being published. Contact to the manufacturer for updated manuals if the DigiCell DLT device is being used.

6 DEVICE SETUP

Device setup enables the user to maintain major parameters of DigiCell connected. The parameters ranges from the read-only device serial number and ROM Version to Display unit, output set points and communication parameters regarding the device type.

Parameters differ in digital input DigiCell devices, such as DigiCell DLT and analog input DigiCell devices, such as DigiCell DC-xxx, LCA-X or LCA-D.

Parameter functions will be explained in brief within this manual, please refer to device manuals for detailed functional descriptions. Some parameters can be updated only if the program key is ON on the device. Please see the related device manuals for where the program key is located.

DLMS-NetWork identifies the device automatically and pops up the related setup window when the Setup button clicked.

SET

6.1 SETUP OF DIGICELL LCA-X, LCA-D, DC-xxx SERIES DEVICES

The setup window has 5 group of parameters:

Identity: Parameters those identifies the device.

Display: Parameters those effect how the device displays the measurements.

Input: Parameters those control the measurements at device input

Output: Parameters those are related with hardware outputs of the device.

Communications: Parameters those specify how the device communicates on the bus.

6.1.1 IDENTITY PARAMETERS



Options

Identity | Display | Input | Output | Communications

Serial Number: 2000000000
ROM version: 1.8
Customer code: 255
Calibration counts: 45
PC Calib. Software: #22: DLMS VP
Calibration Date: 25/8/2002

Description
Please click on a selection/entry box to modify.

Program key ON OK Cancel Apply

Serial Number (Read-only)

The serial number that has been specified during production.

ROM version (Read-only)

The version of device software.

Customer code (Read-only)

A code for some system specific behaviour. 0 or 255 in standard systems.

Calibration Counts (Read-only)

The number identifying how many times device has been calibrated. This number incremented each time when calibration made.

PC Calibration Software (Read-only)

The ID and name of the software that used for last calibration process.

Calibration Date (Read-only)

The date of calibration if known. The date is updated each time after calibration by PC software. The time may not be known if the device has been calibrated by its own user interface.

6.1.2 DISPLAY PARAMETERS

The screenshot shows the 'Options' dialog box with the 'Display' tab selected. The 'Decimal Point' is set to '(2) 1.00', 'Display Unit' is '(1) kg', 'Scale Type' is 'Single Interval', 'e' is '(3) 10', 'Max' is '3000.00 kg', and 'n' is '30000'. A description box at the bottom says 'Please click on a selection/entry box to modify.' Buttons for 'OK', 'Cancel', and 'Apply' are at the bottom right.

Decimal Point

DigiCell devices provide measurements in fixed-point form. The position of decimal point can be selected by decimal point selection box.

Display Unit

Display unit is only used for user interface of built-in device display and for PC software. The unit has no computational function. It can be selected to appropriate unit by the selection box.

Scale Type, “e” and “Max” values

Scale Type specifies how “e” will be handled. Can be chosen from Single Interval, Multi Interval and Multi Range.

“e” value is the increment or decrement of displayed value when load changes. “e” value is based on the least significant decimal digit of measurement value, i.e. the display value will increase or decrease by 0.02 if decimal point is selected as 1.00 and “e” selected as 2.

The device uses only one “e” value for all range if Single Interval selected. It displays the Maximum alert message over the Max value with a tolerance.

On Multi Interval or Multi Range selection, two “e” and “Max” values will be available for selection as “e1,e2 and Max1,Max2”. Basically e1 is used for measurements below Max1 value and e2 is being used above Max1 value. Max2 value corresponds to the alert value.

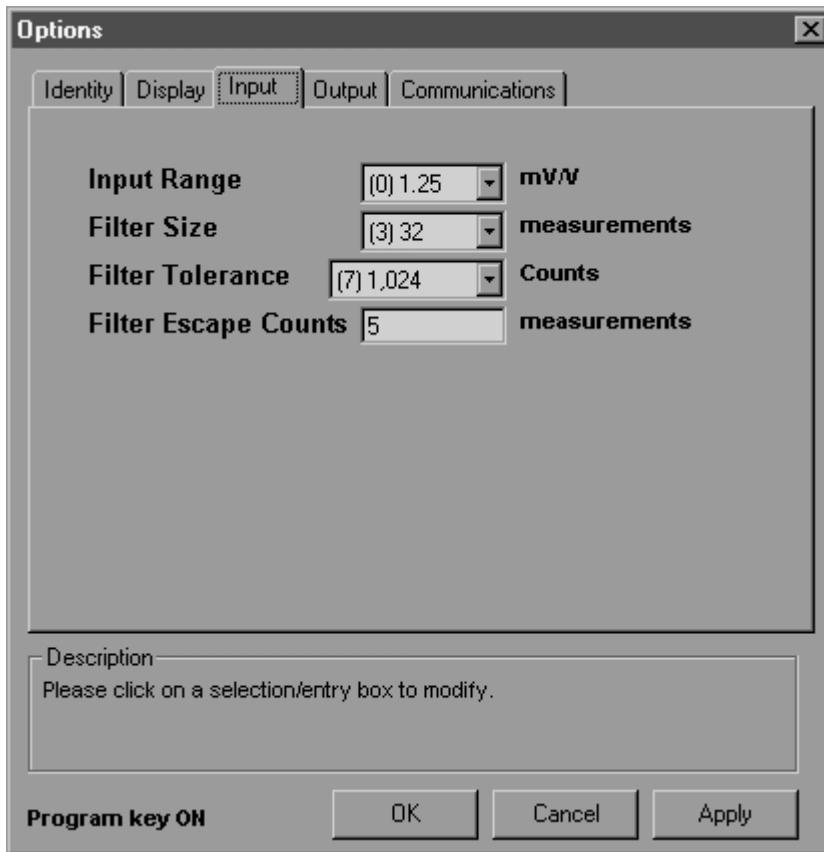
The difference between Multi Range and Multi Interval is the behavior of output when Max1 exceeded and fallen below. The e1 is used below Max1 and e2 used above Max1 in Multi Interval Scale Type, the “e” value that is being used returns to e1 if the measurement falls below Max1. The Multi Range option provides “e” value not to return to e1 state when measurement falls below Max1 unless measurement is actually zero with a tolerance.

6.1.3 INPUT PARAMETERS

Input parameters are devised for input measurements stability regarding to the input bridge ratio, environmental conditions and load change characteristics. The filtering mechanism and its parameters plays a major role for input measurement stability. The input filter of DigiCell devices are adaptive for fast load changes. The combined behavior of Filter Size, Filter Tolerance and Filter Escape Counts parameters are explained as adaptive filter behavior below;

The adaptive filter behavior: The filtering mechanism is based on the average of measurements collected respectively and accumulated to FIFO method memory. The size of the FIFO (in number of measurements) varies 1 to the Filter Size specified. Each measurement from the input is compared to the current value that has been filtered and the last measurement from input enters to the FIFO filter directly if the difference between last measurement and the filter value is less than the Filter Tolerance value. The measurement is disregarded if it exceeds the difference and counted as a possibly inappropriate value (i.e. caused by mechanical vibration or electrical noise from the input). The count is reset after first in-range measurement and the last measurement enters to the FIFO filter. The FIFO completely cleared and restarts with last measurement acquired if the count of inappropriate values exceeds the Filter Escape Counts value. The number of values in FIFO filter will grow from 1 measurement to the number of measurements specified by the Filter Size parameter.

A proper input stability is based on the followings that can be specified.



Input Range

Specifies the input Wheatstone bridge ratio in mV/V. Selection of the proper range is important since the input of the device will go into overflow state and produce an error when the bridge ratio becomes higher than the selected value or the measurement will lose accuracy if selected excessively higher than the bridge's maximum ratio.

Filter Size

Filter size is the number of measurements that is buffered and used for calculations during filtering. The greater the value the more stable measurements get and measurement speed reduces. The lower the value the lower stability gets and the device will respond faster to a change in its input.

Filter Tolerance and Filter Escape Counts

Specifies the behavior of the system for adapting to fast load changes. The value of Filter Tolerance is in Internal counts (ranges from 0 to 1,048,576) that stands for the input measurement resolution of internal analog to digital

converter. Attention: These values must be selected lower when filter size is small. Excessive Filter Escape Counts values may cause excessive delays in all conditions, this value must be used with care.

6.1.4 OUTPUT PARAMETERS

Output parameters are devised to control of the device hardware outputs such as relays and analog output.

Relay outputs

Determines setpoints and setpoint conditions for devices that support relay outputs. “Above or equal” or “Below” options are selectable and can be based either on net value or gross value. The units of setpoints are determined by the common measurement unit set by Display Unit from Display Tag.

Analog Output

Determines the measurement/output ratio of analog output to value measured. Analog output can be selected to be based on Net value or Gross value.

The “From” value corresponds The value “0” displayed and “To” value corresponds to Maximum value (Max or Max2 value specified by Display tag). The analog output decreases with increasing load if “From” value is lesser than “To” value.

The difference of “From” value an “To” value must be greater than 3mA’s. Values above 25mA and the difference below 10mA may cause loss of accuracy at output.

6.1.5 COMMUNICATIONS PARAMETERS

Communications parameters are used to specify how the device communicates with the PC.

Please pay attention for following warnings before setting this parameters;

- 1- Do not confuse PC communication parameters with Communications Parameters. PC communication parameters that accessed by panel button directly specifies the PC side of operation.
- 2- Specifying incorrect parameters may result access problems to device.
- 3- Never change communication parameters if more than one device are operating on the same bus.

The screenshot shows a software dialog box titled 'Options' with a 'Communications' tab selected. The dialog contains several configuration fields:

- Protocol:** (0) RTU
- Baudrate:** (3) 9600
- Parity:** (0) None
- Data Bits:** (1) 8 Bit
- Stop Bits:** (0) 1 Bit
- Delay (ms):** 0
- Time-Out (ms):** 2
- Modbus Address:** 1

At the bottom of the dialog, there is a 'Description' field with the text: 'Please click on a selection/entry box to modify.' Below this are three buttons: 'OK', 'Cancel', and 'Apply'. A 'Program key ON' label is located at the bottom left of the dialog.

Protocol

Specifies the major ModBus option. RTU protocol is a binary protocol that devices detect the message termination by a specified time delay. ASCII protocol is a text based data transfer and the termination characters are standard Line Feed and Carriage Return ASCII characters. In brief RTU is faster than ASCII since the amount of data flow requires less bytes to communicate. ASCII method is supported by DigiCell family since a PC is not essential as a master device, PLC and third party equipment can also be used for this purpose.

Baudrate, Parity, Data Bits and Stop Bits

Specifies the framing for communications. Some combinations are not allowed by DigiCell devices.

Following combinations of framing are not supported;

- RTU protocol with 7 Data Bits
- No Parity, 7 Data Bits, 1 Stop Bit
- Even or odd parity, 8 Data Bits, 2 Stop Bits

Delay

Initial delay before a ModBus package sent by the device. This feature supported for slow response DCE devices or slow protocol converters. Mostly specified as zero for PC environment.

Time-Out

Operates for different purposes regarding RTU or ASCII mode is being used. It specifies the termination duration of the package when operating in RTU mode. It specifies the cancellation time-out if a premature package met while operating in ASCII mode.

ModBus Address

The address of the device on the bus. Must be specified properly even if only one device operates on bus of RS232 physical layer used for communication.

7 LOGS

Logs are intended to be used not only for recording the measurements to a text file but also the events the user done by the software.

Logs can be enabled or disabled, each item can be selected to be logged. To maintain with logging controls the Logging button must be clicked to open the following window.

